

1     ABSTRACT OF THE DISCLOSURE

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3         Laser lines at 635 nm or longer (ideally 647 nm) are pre-  
4         ferred for red, giving energy-efficient, bright, rapid-motion  
5         images with rich, full film-comparable colors. Green and blue  
6         lines are used too — and cyan retained for best color mixing,  
7         an extra light-power boost, and aid in speckle suppression.  
8         Speckle is suppressed through beam-path displacement — by  
9         deflecting the beam during projection, thereby avoiding both  
10        absorption and diffusion of the beam while preserving pseudo-  
11        collimation (noncrossing rays). The latter in turn is impor-  
12        tant to infinite sharpness. Path displacement is achieved by  
13        scanning the beam on the liquid-crystal valves (LCLVs), which  
14        also provides several enhancements — in energy efficiency,  
15        brightness, contrast, beam uniformity (by suppressing both  
16        laser-mode ripple and artifacts), and convenient beam-turning  
17        to transfer the beam between apparatus tiers. Preferably de-  
18        flection is performed by a mirror mounted on a galvanometer or  
19        motor for rotary oscillation; images are written incrementally  
20        on successive portions of the LCLV control stage (either opti-  
21        cal or electronic) while the laser "reading beam" is synchro-  
22        nized on the output stage. The beam is shaped, with very lit-  
23        tle energy loss to masking, into a shallow cross-section which  
24        is shifted on the viewing screen as well as the LCLVs. Beam-  
25        splitter/analyzer cubes are preferred over polarizing sheets.  
26        Spatial modulation provided by an LCLV and maintained by pseu-  
27        docollimation enables imaging on irregular projection media  
28        with portions at distinctly differing distances from the pro-  
29        jector — including domes, sculptures, monuments, buildings;  
30        waterfalls, sprays, fog, clouds, ice; scrims and other stage  
31        structures; trees and other foliage; land and rock surfaces;  
32        and even assemblages of living creatures including people.